

THE IMPACT OF RESIDENTIAL ENVIRONMENT ON  
PSYCHOLOGICAL ADJUSTMENT OF COLLEGE STUDENTS

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL OF THE  
UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT OF THE  
REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1998

## ACKNOWLEDGEMENTS

I extend sincere thanks to Dorothy Nevill and Franz Epting for their assistance with this manuscript and, more generally, for their guidance during my graduate career. I am indebted to Shawn Prichard for friendship and intellectual stimulation, as well as, more concretely, technical assistance with the data analysis here presented. My thanks for the extraordinary support provided by my family—especially my parents, Don and Sylvia Campbell, and my grandmother, Mary Alice Knight—cannot be adequately acknowledged here.

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Abstract of Dissertation Presented to the Graduate School of the University of Florida in  
Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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May 1998

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Major Department: Counseling Psychology

This study investigated the relationship of residential environment and location to the psychological adjustment of college undergraduates. Students from several institutions were asked to provide information about their housing environments (e.g., location, noise estimates, light levels, number of roommates, and contents of the visual landscape) and to complete a multiple-scale measure of psychological adjustment: the College Adjustment Scales. The contribution of residential environment to psychological well-being was demonstrated via multiple multivariate analyses controlling for the influence of psychological treatment history and demographic characteristics. Results demonstrated that environmental variables, particularly the presence of grass in window vistas and lower subjective ratings of noise and light levels, were positively associated

with psychological adjustment. In addition, the association of treatment history with current adjustment was elucidated through post-hoc analyses. Finally, this study addresses the psychometric properties of the College Adjustment Scales, underscoring their limitation as a research instrument. The discussion addresses the theoretical implications of the findings in terms of the extant literature on psychological benefits of natural landscape elements. The conclusion addresses potential contributions of qualitative approaches as a compliment to quantitative landscape research.

## CHAPTER 1 INTRODUCTION

The interface of counseling or clinical psychology with the broader perspective of environmental or ecological approaches has generated a number of novel research questions regarding the impact of environmental features on psychological well-being. The present study is a contribution to this tradition, although the geographic domain of this research—the campus community—has been relatively, and surprisingly, neglected in previous work. This paucity of research is peculiar for a number of reasons. First, of course, is the irony that most academic researchers in psychology, of any specialty, work in a campus setting. Certainly psychologists have ample exposure to campus environments; in fact, one could effectively argue that the campus context shapes the process and outcome of research in environmental psychology just as it does for other fields. Second, student affairs personnel have secured a prominent place in higher education. These professionals, whose mandate includes responsibility for administration of campus living spaces, activities, and conduct, have evidenced interest in ecological perspectives and recognized clearly that a student's collegiate experience is contextualized by a campus system comprised of social, (multi) cultural, spatial, and physical factors. Indeed, the academic and professional journals in college student personnel have endorsed ecological approaches to campus design (e.g., Banning & Kaiser, 1974). Third, campus mental health professionals, particularly counseling psychologists, whose training usually affords substantial exposure to college-age

populations, are keenly aware of mental health issues on campus and often work from a developmental perspective concerned with psychological (and geographical) transitions. Fourth, other researchers, principally geographers and sociologists concerned with the impact of place, could contribute to the understanding not only of measurable environmental impact but also, more qualitatively, of *genius loci*, the spirit of place, the totality of a landscape, encompassing intangible and transcendent qualities that account for the uniqueness of place (Seamon, 1989).

Given the diversity of intellectual traditions that can profitably address the role of physical environment in the psychological experience of college students, the relative dearth of research is disappointing. Perhaps the relevant disciplines are so divergent in training and practice that fruitful cross-disciplinary collaboration is seldom afforded. Indeed, the current study is, of necessity, focused on a limited number of research perspectives and analytical methodologies. Taylor, Zube, and Sell (1987) offer a useful classification system for research evaluating landscapes. Their nomenclature distinguishes four approaches to landscape research: the psychophysical, cognitive, expert, and experiential. The psychophysical and cognitive approaches both focus on human responses as measured by quantitative techniques, often self-report of scenic beauty estimates or landscape preference; the two approaches are distinguished from each other chiefly by the emphasis placed on human information processing theory. Whereas the psychophysical approach typically assumes that humans are passive (and unconscious) responders to the environment, the cognitive approach holds that structures and needs of our information processing systems mediate our experience of the environment. Thus, in the psychophysical paradigm, psychological responses to environmental stimuli are measured; in the cognitive paradigm,



however, theory derived from cognitive psychology helps explain why certain psychological responses are obtained. The expert paradigm holds that those best qualified to evaluate landscape achieve such status only through heightened sensitivity inculcated by professional training. Such evaluations may be more subjective than those of psychophysical and cognitive methods, but the persons making decisions presumably have a more sophisticated perspective derived from education and work experience. The fourth paradigm, the experiential approach, focuses on the experience of diverse individuals or groups and usually employs qualitative, often phenomenological, methodology. A graphical summary of these approaches is presented in Table 1-1.

Table 1-1: Paradigms for Landscape Evaluation

Paradigm	Methodology	Ratings given by	Theoretical focus
Psychophysical	quantitative	laypersons	stimulus-response
Cognitive	quantitative	laypersons	information processing
Expert	qualitative/quantitative	experts	expert design
Experiential	qualitative	laypersons	humanistic/phenomenological

The approach taken in the present research is best represented by the psychophysical and cognitive paradigms. The approach is psychophysical because it attempts to demonstrate linkages between specific environmental features and psychological outcomes. However, it is cognitive, as well, inasmuch as theoretical assumptions about psychological reaction to environmental stimuli were used to generate hypotheses. In another manner, this

study is conceptually distinct from “mainstream” landscape research. The latter tends to operationalize psychological reaction in terms of preference; in contrast, the present study is expressly concerned with psychological adjustment as a criterion measure. Thus, psychological outcomes of importance here include not preference but impact on mental health in the domains of depression, anxiety, substance abuse, interpersonal distress, among other areas.

In the chapters that follow, these issues are addressed both theoretically and empirically. Chapter 2 reviews the extant literature in counseling/clinical psychology, environmental psychology and college student personnel. The chapter begins with a treatment of ecological approaches that place the student into an integrated, transactional environmental system (e.g., Kaiser, 1977). The subsequent section reviews existing research on the impact of environmental features on psychological well-being and recent calls for a more transactional understanding of psychological functioning. The following sections summarize findings of the student affairs literature (e.g., Chickering & Reisser, 1993) regarding characteristics and needs that distinguish commuters from residential students, concluding that the extant literature has neglected, for the most part, psychological measures of differences. A methodological critique then proposes alternative measures of adjustment that would better operationalize psychological status: the College Adjustment Scales (CAS; Anton & Reed, 1991) and the College Maladjustment Scale (Mt; Kleinmuntz, 1960). The next sections summarize the psychological benefit of specific environmental features, such as nature scenes (Kaplan & Kaplan, 1989; Ulrich, 1981), windows (Butler & Biner, 1989), and configural aspects of landscape (Campbell, 1994; Herzog, 1989, 1992; Kaplan & Kaplan, 1989). In addition, this section includes a brief review of detrimental

features, such as crowding (Evans & Lepore, 1993; Krupat, 1985; Milgram, 1970), noise (Levy-Loboyer & Naturel, 1991) and barriers to commuting (Novaco, Kliewer, & Broquet, 1991). Chapter 2 concludes with a summary of the rationale for the present study and a series of tentative research hypotheses.

Chapter 3 details methods and research design, including sample characteristics, psychometric characteristics of the research instruments, procedural protocol, and the general strategy for data analysis. This last topic includes discussion of the methodological challenges inherent in multivariate quasiexperimental design, as well as the rationale for use of multivariate analysis of variance (MANOVA) with a series of follow-up stepwise multiple regression equations. This section also reviews some unanticipated problems in protocol administration leading to the exclusion of College Maladjustment Scale scores from the final data set.

Chapter Four presents results in several sections. First, a descriptive summary of predictor and criterion variables is offered. Second, results of MANOVA analyses demonstrate the significance of predictor variables for scores on the nine-scale College Adjustment Scales. Third, a series of stepwise multiple regression models for each of the nine CAS scales follows the MANOVA in order to model specific environmental effects on anxiety, depression, suicidal ideation, substance abuse, self-esteem, interpersonal problems, family problems, academic problems, and career problems. A fourth set of analyses examines multicollinearity among the nine CAS scales, as well, via principal components analysis of the factor structure underlying the CAS. Inadequacies of the factor structure are discussed, and an alternative measure of global adjustment is proposed. Finally, a regression model of global adjustment is offered, although this new model, contrary to

expectation, offers little additional information relative to models of scores on each of the nine component CAS scales

The final chapter is a discussion of the present findings and argues that, although treatment indicators and subject variables are most predictive of adjustment, some environmental variables (e.g., grass, noise, light, residential satisfaction and, to a lesser extent, number of roommates) also manifest a relationship with psychological functioning. The implication of these finding for campus architects, student affairs professionals, mental health providers, and educational policy makers is discussed. Additionally, the psychometric inadequacy of the CAS is discussed. The conclusion advocates the use of alternative measures for future research (1) to avoid the stringency imposed by MANOVA and (2) to achieve better discriminant validity. The final sections suggest directions for future research, particularly the integration of quantitative and qualitative approaches pioneered by researchers such as Schroeder (1991). Such integration simultaneously offers both testable hypotheses and a fuller understanding of the more intangible, subjective, and transcendent qualities of place (Relph, 1985; Seamon, 1984, 1989).

## CHAPTER 2 REVIEW OF LITERATURE

### Campus Ecology as Context

The psychological adjustment of college students has received substantial attention in the literatures of counseling psychology and college student personnel. However, comparatively scant research focus has been directed toward the impact of residential environment on psychological adjustment. This trend is manifest in spite of a relatively well-known literature of campus ecology, in which college environments are viewed as interactive environmental systems (Banning & Kaiser, 1974; Morrill, Oetting, & Hurst, 1974; Pace, Stamler, Yarris, & June, 1996). Although the importance of physical environment is usually acknowledged in ecological models, greater emphasis has been placed on sociocultural, interpersonal, and academic factors; as a result, physico-spatial aspects of college student adjustment have been relatively neglected.

Nonetheless, it is appropriate to begin this review with an explication of campus ecology as context for the present study. Although this research focuses on one, relatively narrow, aspect of college environment, the study here presented is most thoroughly understood in the context of campus ecological systems which are integrative, comprehensive, and most especially, transactional in nature.

Campus ecology is concerned both with the student's "consciousness" and the environment in which he or she lives (Kaiser, 1977). The campus environment consists

of varied spaces: the personal, the social, the physical, the academic and any number of others relevant to the experience of the student. Campus spaces are settings for student growth and development and, thus, are integral parts of the college experience. This view obviates the need for considered attention to space by campus designers and policy makers:

Every learning space has a demand load. It calls for certain responses from the student entering the space. A student and campus may be matched or mismatched. A mismatched space is one that fails to provide what the student needs or demands a response the student cannot give. Too great a mismatch is stressful for the student and may generate a negative reaction (Kaiser, 1977, p. 24).

The student's experience is shaped by the college environment, but the relationship is not simply one of causative factor to responding organism. Rather, a more dynamic, holistic conceptualization, in which students in environment are the primary unit of analysis, is taken here. This approach, developed by Altman (see Altman & Rogoff, 1987 for delineation of this view) and expanded by others (cf. Wapner, 1995), is characterized by a systems-centered perspective that, when applied to campus environments, holds that students are integral components of the larger campus environmental system. Such an approach suggests that the process of influence is mutual among interconnected elements. That is, a college student's experience is molded by multiple elements of the environment, but that same student--and, by extension, larger groups of students--is also an active shaper of the environmental system, because he or she *belongs* to that system. This view implies that the personal characteristics which students bring to college, including life history, personality traits, and psychological (dys)function become important influences in the person-environment system. In terms of the present study, this theoretical perspective

suggests that the decisions students make about their residential choice will be impacted by personal and environmental factors, and that students' college housing environments will act to shape their educational experience and psychological well-being.

Campus mental health professionals have shown some interest in an ecological conceptualization of student functioning, although a review of the literature suggests that this perspective has been limited in scope and influence. Morrill, Oetting, and Hurst (1974) proposed a framework for counseling interventions not limited to the therapy room. Their model, delineated in terms of target, purpose and method of intervention, expands the target domain of campus counseling staff from the traditional individual client to include primary groups (friends and family), associational groups (e.g., classes, student organizations and residence-based groups), and, most broadly, the institution or campus community. This model also expands method of service delivery beyond direct therapeutic contact to consultation, training and use of media. Finally, the purpose of intervention is defined to include, in addition to remediation of psychological difficulties, the more proactive goals of prevention of mental health problems and development of individuals and campus systems. This framework justifies, from the perspective of campus mental health providers, the need for collaborative systems-focused research and intervention in a number of areas relevant to the psychological health of students. A recent expansion of this model (Pace, Stamler, Yarris, & June, 1996) places campus counseling centers in a more dynamic ecological system, allowing greater flexibility to adapt functions to changing campus needs. That is, campus mental health professionals are seen as connected to multiple constituencies and facets of the campus system; services evolve as a function of these interrelationships. Although these models certainly broaden the legitimate domain of college mental health,

neither addresses explicitly the psychological aspects of residential environment. Similarly, a recent prescription for expansion and adaption of college counseling center services (Bishop, 1990) advocates broader collaboration and consultation with other campus entities; again, however, the psychological aspects of place and physical environment are not explicitly addressed. The interface of college counseling and environmental psychology is best described as a legitimate but largely unexplored area of inquiry. I now turn to a review of available literature in this and allied areas.

#### The Interface of Research in Environmental and Counseling /Clinical Psychology

The environmental psychology literature is a potential arena in which to address the psychological impact of campus residential environments. Indeed, recent appraisals of the field have stressed the potential for fruitful integration of environmental and counseling or clinical psychology. Stokols (1995) highlights recent trends and prospects for future work in the application of environmental psychology research to community problems, including the development of environmental strategies in health promotion. He cites several recent theoretical and basic research endeavors to document the contributions of psychology to social and psychological welfare. These include a number of efforts to understand the processes by which environmental stress can be ameliorated, through reduction of crowding (Aiello & Baum, 1979), better management policy for environmental hazards (e.g., Cvetkovich & Earle, 1992), and increased exposure to natural environments in offices and health care settings (Kaplan & Kaplan, 1989; Ulrich, 1981, 1984, 1991).

Demick and Andreoletti (1995) review a number of recent studies in order to elucidate connections between environmental and clinical psychology. The authors



distinguish between fields in terms of content and method, positing that clinical psychology is defined by its content area (i.e., diagnosis and treatment of psychological conditions) as well as a method of research and clinical practice. Environmental psychology, similarly, is identified by its concern with physical, interpersonal, and sociocultural environmental factors and by a more general world view of organism-environment functioning.

Demick and Andreoletti posit several conclusions regarding the integration of clinical and environmental theoretical perspectives and research methodologies. First, they suggest that broad, integrative perspectives in both fields tend to produce novel research foci, such as the impact of physical relocation on an inpatient psychiatric community (Demick & Wapner, 1980) or the role of personal space in therapy or clinical supervision. The present study is one attempt to respond to the call for cross-disciplinary research. Second, Demick and Andreoletti conceptualize environmental perspectives as an alternative to traditional person-centered approaches to diagnosis and treatment; that is, "the unit of analysis in psychopathology might more aptly be conceptualized as the person-in-environment system" (1995, p. 65). Although the research cited to support this notion focuses primarily on quite disturbed psychiatric patients, particularly those with schizophrenic diagnoses, this conceptualization applies analogously to college students, for whom adjustment, in this model, would be a function of the student-in-campus-community system. Finally, Demick and Andreoletti propose a model of psychological functioning in terms of a series of environmental transitions throughout the lifespan. The transition to a college community (and developmental transitions *within* the community) are relevant to the present study, which focuses on the role of residential environment in transition to and function in the college setting.

Interestingly, the initial base of college environment research comes not from environmental or clinical psychology but rather from the fields of higher education and college student personnel. These early investigators were motivated by pragmatic concerns in response to the changing demographic characteristics of American undergraduates in the 1960s; they sought to provide empirical bases for policy adjustment both in academic affairs and in student life as colleges and universities struggled with the influx of commuter and part-time students. This new wave of students, as a group, entered higher education with significant differences from traditional residential students in educational background, family experience, and perhaps most importantly for policy makers, educational goals and expectations. These new students encountered a number of difficulties relative to the modal college student of the 1950s and challenged core assumptions of traditional policy makers in higher education. The challenge was met with empirical research.

#### Residential Status and the Welfare of Commuter Students

Student development researchers and professionals have devoted considerable attention to the divergent experiences of commuter and residential college students during the last three decades. Chickering (1974) provides the first book-length treatment of the subject in a comprehensive account of a large-scale study involving over 160,000 students from 270 diverse post-secondary institutions. Most publications have stressed the benefits afforded to students whose on-campus residence facilitates access to peer networks and to residence life programs offered by student affairs staff. With few exceptions, the distinction between off-campus residents and commuters living at home has been neglected; this is a crucial shortcoming, because it confounds the impact of family influence with residential

location. Moreover, increasing numbers of college students have elected to live off-campus, even when they are in school a long distance from their family's home, in response to rising room and board costs as well as campus housing shortages. I begin with Chickering's work, which has provided the base-line for subsequent investigation. I consider additional research in the paragraphs that follow, in order to generate hypotheses regarding the psychological impact of residential location.

Chickering (1974; see also Chickering & Reisser, 1993) provides a thorough empirical summary of significant differences in demographic background and college experience between commuter students and on-campus residents. Commuter students, in his sample, reported lower high school grades, and increased financial and interpersonal stressors. Their families of origin were of lower socioeconomic status, measured in terms both of reported income and of paternal occupation (fathers of commuters were more likely to be skilled, semiskilled, or unskilled workers). Chickering also reported that the majority of commuter students applied only to the college or university which they currently attended. Their educational goals were more focused on vocational preparation than those of residential students; in fact, commuters more frequently majored in business administration or engineering. Moreover, commuters were less likely to report plans to seek an advanced degree. Thus, Chickering's data suggest that commuter students enter college significantly constrained by contingencies external to their educational environments and tend to plan their education on the basis of proximity of available programs and the practicality of their degrees. Many of these students attend institutions with primarily or exclusively commuter populations; of course, many also enroll in colleges

or universities with strong residential traditions. Indeed, increasing numbers of students are members of the latter group.

Chickering asserts that commuter students enrolled in residential institutions experience many of the same external pressures reported by those enrolled in commuter schools. These contingencies make for an educational experience more fraught with challenges than that typically experienced by their residential classmates. Moreover, commuter students often have difficulty developing attachment to the university and its people as a function of their somewhat marginalized status and limited opportunities for involvement in campus life. There is good reason, therefore, to expect that commuter students, whether they attend commuter or residential schools, will report greater difficulties in terms of personal and psychological adjustment. In fact, Chickering found that commuters living with family had the least frequent interactions with faculty when compared to residential students or those living in off-campus housing. This deficit was not confined to relationships with faculty, since commuters living at home were also the least likely to study with their classmates. Moreover, students living in private off-campus residences were the least satisfied with their college experience and the least likely to report plans to continue full-time study. These myriad differences in experience held true for students enrolled in every category of educational institution included in Chickering's sample, including universities and colleges, public and private schools, two-year and four-year programs, and Protestant and Catholic institutions.

Other researchers have demonstrated similar differences, though not with absolute consistency. Graff and Cooley (1970) assessed differences between dormitory residents and commuter students (living at home) using the College Inventory of Academic

Adjustment (Borow, 1951). At the conclusion of the first semester of their first year, the two groups did not differ significantly on scale measures of study habits, interpersonal relationships with faculty and peers, or personal efficiency (time management). However, commuter students reported poorer curricular adjustment, in terms of satisfaction with course work and maturity of goals and aspirations. Moreover, commuters reported poorer mental health on a scale associated with poor self-confidence, feelings of failure and excessive worry. These differences were independent of ability levels measured by the verbal section of the Scholastic Aptitude Test. On the basis of these results, Graff and Cooley recommend that college counseling centers promote the availability of services for commuters, that special orientation programs be targeted to commuter students, that faculty be sensitive to the needs of their commuter advisees, that student unions provide special facilities for off-campus students, and that campus activities personnel endeavor to make commuters aware of available programs.

George (1971) found few significant personality differences on the Edwards Personal Preference Schedule (1959) between high school seniors planning to live on campus during their freshman year and those planning to commute from home. In fact, the most powerful predictor of students' decisions was not a personality trait but, rather, the socioeconomic status of their family of origin. Commuters students did show greater needs for autonomy and dominance, while residential students showed greater needs for change and aggression. However, the importance of these personality differences is questionable, given the very small magnitude of their impact. George's statistical analysis is reported rather telegraphically, but his research nonetheless makes clear that the predictive utility of the model is low. An aggregate stepwise multiple regression procedure, in which familial

socioeconomic status accounted for the lion's share of the variance, explained only about 9 percent of the variation in residential choice.

In a similar study, Welty (1976) reported a number of significant personality differences between first-year students living in dormitories and those living with parents. Commuters had lower scores on the intellectual disposition, thinking introversion, estheticism, complexity, autonomy, and altruism scales of the Omnibus Personality Inventory. Each of these differences, with the exception of autonomy scores, was maintained when the students were retested at the end of two quarters. In addition, dormitory residents participated more frequently in extracurricular activities and formed more new relationships with students and faculty. Welty concludes that student growth is not simply a function of living situation but rather that the formation of these relationships (presumably afforded by on-campus residence) is a critical developmental factor.

More recently, Wilson, Anderson, and Fleming (1987) found that commuter students reported more psychological difficulties than residential students, in terms both of personal maladjustment and of overinvolvement with parents. Their research operationalized adjustment in terms of family systems theory, particularly the concept of fusion, which is defined as the tendency for two individuals to blend in such a way that emotional and psychological boundaries between them become blurred, confused, or overlapped. Family therapy research suggests that such relationships are unhealthy because they inhibit self-determined, goal-directed activity. Using the Intergenerational Fusion subscale of the Personal Authority in the Family System Questionnaire (Bray, Williamson, & Malone, 1984), Wilson and colleagues demonstrated that first-year college commuter students had significantly higher fusion scores than those of dormitory residents; this trend

was not observed, however, in more advanced students. This study also measured more general psychological adjustment using the College Maladjustment Scale (Mt; Kleinmuntz, 1960, 1961) of the Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1943). Students living with their parents reported greater levels of maladjustment than on-campus residents, regardless of their year in school.

Finally, Pascarella, Edison, Nora, Hagedorn, and Terenzini (1996) found, in a large-scale correlational study, that on-campus residence was an important predictor of openness to diversity and challenge among first-year college students. Controlling for the contribution of multiple other predictors, including demographic variables, institutional environment, social life, and academic experiences, Pascarella and colleagues found that on-campus residence was a significant predictor of students' openness to ethnic and cultural diversity, as measured at the conclusion of the freshman year. Thus, campus residence may play a role not only in current levels of psychological adjustment but also in future ability to maintain interpersonal adjustment in an increasingly multicultural environment.

The research reviewed thus far provides empirical documentation of the differences between students living with family and those residing in college dormitories. The problematic position of these commuters is assumed to have some relationship with variables intrinsic to the family of origin, primarily socioeconomic context or some functional pathology in the family system (especially with regard to the student's ability to develop a well-defined extra-familial identity). What of the growing number of commuters choosing to live off-campus in private housing, away from family? These students may experience difficulties solely as a function of their relative isolation from the campus

community. Are the psychological correlates of commuter status observable independently of students' relationships with their families?

Scant study of this group of students is reported in the literature. However, the stressful consequences of commuting have been observed in other settings and with other populations. For example, Novaco and colleagues (1990, 1991) have conducted an ongoing research program demonstrating the deleterious effects of objective and subjective impedances encountered by commuters who drive daily to and from work. The negative impact of these impedances is evident in terms of commuters' negative mood at home, measured using a short semantic differential scale, and dysphoria, measured using a sub-set of items from the Global Stress Scale (Cohen, Kamarck, & Mermelstein, 1983). In the present study, off-campus residents should experience impeded access to campus relative to their peers residing in dormitories; thus, such students should report greater adjustment difficulties, especially as the distance of their residence from campus increases.

#### Methodological Critiques

The existing research on commuter students has stimulated greater awareness, policy changes and impetus for further inquiry. However, the literature is subject to critique for a number of reasons. First, most research has failed to make explicit distinctions between commuters residing with their family of origin and those simply electing to live off campus alone or with non-family members. This latter group is likely to continue to increase at institutions whose enrollment expansion is outpacing construction of new dormitories. Second, a shared definition of adjustment has been evident neither in multiple research conceptualizations nor in the wide variety of criterion measures used to operationalize student functioning. This phenomenon is due, in part, to the multifaceted



nature of adjustment, a concept which connotes multiple domains of student well-being. However, extant shortcomings in the measurement and conceptualization of adjustment limit our understanding of environmental impact.

Psychological adjustment is an important component of comprehensive adjustment, but psychological measurement probably has not been adequately operationalized in the studies reviewed. First, many of the measures are not well-validated clinically, because their primary application has been as research scales (e.g., the Global Stress Scale). Second, many measures address differences in personality style or preference. These differences provide interesting information, but they do not address psychological problems directly; that is, differences in personality styles do not necessarily offer information regarding the presence of, or even the potential for, psychological difficulties. Thus, personality measures have limited utility for clinicians seeking to understand any hypothesized negative consequence of living environments, as well as for policy makers seeking more conclusive demonstration of environmental impact. The clinical scales that have been employed, such as the family fusion measure used by Wilson, Anderson and Fleming (1987), tend to focus on narrowly-defined criterion variables rather than on the typical range of mental health problems seen in a college population.

A broad-based, well-validated clinical measure of psychological adjustment would provide a more useful measure of residential impact. Only one of the reviewed studies (Wilson, Anderson, & Fleming, 1987) has employed such a general clinical measure, the College Maladjustment Scale (Kleinmuntz, 1960) of the MMPI. The College

Maladjustment Scale (Mt) is a 41-item<sup>1</sup> supplementary scale embedded in the original MMPI (Hathaway & McKinley, 1943) and retained in the revised Minnesota Multiphasic Personality Inventory-2 (Butcher, Dahlstrom, Graham, Tellegen, & Kraemmer, 1989). The scale was developed by Kleinmuntz (1960) via item analysis of the original MMPI to differentiate college students seeking psychotherapy from the general student population. The items tap diverse issues, including perceived ineffectualness, diminished interest, procrastination, life strain and anxiety. Efforts to develop criterion cutoff scores have been problematic (Kleinmuntz, 1961; Kuczka & Handal, 1990). The scale is not a particularly good predictor of potential psychological difficulties (Parker, 1961; Dahlstrom, Welsh, & Dahlstrom, 1975) but has utility in terms of identifying levels of current maladjustment among students in a college setting (Graham, 1993). Importantly, the Mt, because it is an omnibus scale, does not allow distinctions among different types of psychological difficulties. The scale criterion is simply the prediction of seeking counseling center services; the clinical interpretation of high Mt scores was based only on informal content analysis of the component items. Thus, the Mt is a poor research instrument if one wishes to make distinctions among the qualitatively distinct adjustment issues (e.g., depression, anxiety, self-esteem, substance abuse) that students experience in college.

Until recently, a comprehensive instrument to measure psychological problems of college students has been unavailable. The MMPI-2 is certainly a potential candidate, but it was designed for persons experiencing a greater degree of pathology than is typical for college counseling centers. When used with a less disturbed population the psychiatric

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<sup>1</sup> The original MMPI (Hathaway & McKinley, 1943) Mt scale contained 43 items.

norms of the MMPI tend to exaggerate individuals' level of psychopathology. Moreover, the length of administration required for a full MMPI can be nearly two hours, making the instrument impractical for a time-limited data collection. The California Psychological Inventory (CPI; Gough, 1987) is another potential candidate and has been widely-used with the demographic group targeted in the current study. In fact, CPI normative data are more appropriate for college students; however, the constructs measured by the instrument are more descriptive than diagnostic.

A more recent instrument, the College Adjustment Scales (CAS; Anton & Reed, 1991) seems a better candidate for research with college populations. The CAS is a 108-item screening instrument designed to identify and categorize types of psychological maladjustment presented by students at university counseling centers. The scales were developed and normed specifically for college populations. The CAS content areas were selected on the basis of a principal components analysis of an intake problem checklist at a college counseling center (Hicks, Reed, & Anton, 1989, cited in manual) and on a survey of assessment needs endorsed by campus counseling center care providers. The final version of the CAS included nine classes of psychological difficulty: anxiety, depression, suicidal ideation, substance abuse, self-esteem problems, interpersonal problems, family problems, academic problems, and career problems. Each scale consists of an equal number of 4-point Likert scale items; the entire CAS can be administered to participants in 15-20 minutes.

The CAS was normed on a sample of 1,146 students from a geographically diverse group of U.S. colleges. The sample was representative of the gender and ethnic composition of the American college student population. The CAS Manual (Anton & Reed, 1991) contains a full description of the initial validity studies. Internal consistency

reliability ranged from .80 to .92 for the component scales; Anton and Reed also provide preliminary convergent and discriminant validity data. Although a relatively new instrument, the CAS has been used in several recent studies of college age populations (Chandler & Gallagher, 1996; Heppner et al., 1994; Street, Kromrey, Reed, & Anton, 1993; Turner, Valtierra, Talken, Miller, & DeAnda, 1996).

### The Impact of Physical Environmental Features on Well-Being

The preceding section examined the effects of residential location and commuting on psychological adjustment. Another important question regards the contribution of housing environment. The second area of focus in the present study regards the influence of specific environmental characteristics of student housing on personal and psychological adjustment. This area of inquiry is better grounded theoretically than that, previously discussed, of residential location. As a group, the studies discussed in the following sections are vulnerable, to some degree, to the same criticism regarding the operational definitions of adjustment that were noted in the review of commuter research. That is, although a number of different measures, often simply preference scores for particular environmental features, have been employed, specific measures of psychological problems have seldom been used. However, the relationship of environment to well-being has often been more compellingly demonstrated, especially through use of psychophysiological correlates of stress (i.e., autonomic responses). What follows is a review of empirical research on the environmental characteristics of housing which are potentially relevant to the psychological well-being of college students.

### Windows

Early literature in this area suggests that windows, particularly those that afford a view of natural landscape elements, have a dramatic positive impact on well-being. Ulrich (1981) demonstrated that the beneficial impact of natural scenes can be measured in terms of psychophysiological correlates of relaxation, such as respiration rate, heart rate and galvanic skin response. Subsequently, Ulrich (1984) demonstrated that window views of nature positively influence the recovery of surgical patients. Patients whose hospital rooms afforded views of nature scenes (e.g., water and deciduous trees) had more positive post-surgical prognosis as measured by a number of measures, including recovery time, need for medication, and report of pain.

More recent research (see Sundstrom, Bell, Busby, & Adams, 1996, for a review) suggests that the impact of windows is more complex and is mediated by social, contextual and environmental variables. For example, Butler and Biner (1989) found that students did not prefer window views in spaces where they might provide a functional impediment, such as computer workrooms. Previous work in this area raises the possibility that the presence of windows will influence both students' ratings of residential satisfaction and associated psychological adjustment.

### Natural Landscape Elements

Stephen and Rachel Kaplan have published decades of research on the psychological benefits of nature. Their theory posits that natural environments are preferred because they facilitate restoration of attentional capacity, fatigued by the sustained focus often required by the myriad competing stimuli of the modern world (Kaplan & Kaplan, 1989). The negative impact of sensory overload in modern urban environments—socially

and psychologically—has been identified as a major quality of life issue (Milgram, 1970; Krupat, 1985). Natural environments, in contrast, elicit *effortless attention* or *fascination*, processes central to the Kaplans' theory. That is, natural landscape elements promote the recovery of attention through the effortless engagement of sensory systems, resulting in an experience both pleasurable and restorative. This restorative experience has tangible impact on psychological and physiological wellness.

On the physiological level, natural environments promote stress reduction through stimulation of the parasympathetic nervous system (Ulrich et al., 1993). The calming effects of exposure to natural scenes have been documented repeatedly (e.g., Ulrich, 1981). Natural landscapes, especially those including water and biomatter, appear to reduce blood pressure, galvanic skin response, respiration rate and self-report of stress. Additional evidence (Ulrich, 1984), mentioned in the previous section, suggests that natural views positively influence the recovery of post-surgical patients.

Which elements of the natural landscape are most important? A useful distinction between configural elements and primary content of landscape clarifies the question. The former refers to the way in which objects are arranged in the stimulus array. Research has shown that landscapes that provide a sense of *coherence* (hanging together) and *mystery* (the promise of new information to be gained by exploration) are especially preferred (e.g., Campbell, 1994; Herzog, 1989, 1992; Kaplan & Kaplan, 1989). Primary content includes the specific objects present in a given landscape. Research has consistently indicated that humans prefer both greenery, particularly tended nature (i.e., manicured gardens), and water scenes.

### Crowding

Two decades of study have documented the deleterious effects of residential overcrowding on the psychological well-being of dwellers. A number of studies have demonstrated the association of crowding with residential dissatisfaction (see Krupat, 1985; Sundstrom, Bell, Busby, & Asmus, 1996). This dissatisfaction is associated with increased levels of psychological stress experienced by persons living in such conditions. Moreover, there is considerable theoretical and empirical evidence that crowding negatively impacts willingness to offer and accept social support. Milgram (1970), in an analysis of the experience of urbanites, suggests that this effect is a function of overload on individuals' social and cognitive capacities; the result is a social withdrawal to manage inputs to an overtaxed sensory system. In a study of college students, Lepore, Evans, and Schneider (1991) demonstrated that persons living in crowded environments experience greater psychological distress, even when controlling for levels of distress prior to their current living arrangements. Evans and Lepore (1993) found that college students from crowded residences were less likely to offer, accept, or perceive social support in a laboratory experiment. The robustness of crowding effects underscores their relevance for the proposed study; a measure of residential population density should be included as a predictor variable.

### Noise

The detrimental impact of noise has been demonstrated in a variety of contexts, including neighborhoods (Levy-Leboyer & Naturel, 1991) and shopping malls (Hopkins, 1994). The modal investigation of ambient noise has operationalized impact in terms of task performance or self-report of annoyance. Thus, examination of effects in terms of

psychological adjustment is a somewhat novel approach. An objective measure of decibel level in housing environments is beyond the logistical scope of the proposed study. However, incorporating students' Likert-scale ratings of noise level in their homes as a predictor variable should yield important information about the subjective importance of ambient noise to participants.

### Rationale for the Present Study

This study is distinguished from previous work on residential satisfaction of college students by an explicit focus on psychological adjustment as a dependent measure. While the importance of satisfaction ratings is salient to planners, architects and housing directors, the psychological impact of residential environment is important not only to these groups but also to mental health professionals. Thus, I propose to incorporate, in addition to a measure of simple satisfaction, two psychometrically validated measures of adjustment: the College Maladjustment Scale of the Minnesota Multiphasic Personality Inventory (Mt; Kleinmuntz, 1960) and the College Adjustment Scales (CAS; Anton & Reed, 1992). Each measure will be described more fully in the materials section of this paper. This emphasis on psychological functioning fills a theoretical vacuum in the existing literature on college residential environments. More specifically, the current study allows an evaluation of environmental factors not limited to simple preference, but concerned as well with the psychosocial correlates of environmental design. A psychological evaluation of housing environments forms a more direct link between the structure of a home and the adaptive functioning of its residents.



The current study examines two primary aspects of the relationship of residential environment with psychological adjustment of college students. First, this study will provide the opportunity to assess the relative importance of residential crowding, residential location, noise level, distance from campus, and access to windows in predicting current levels of psychological adjustment. My decision to incorporate these predictor variables (and, consequently, to exclude others of potential importance) is a function both of pragmatism and of attention to the existing literature on residential environments. A limited number of variables is necessary to ensure the feasibility of this study. Moreover, these particular variables were chosen in part because they are amenable to quantitative analysis. More abstract phenomena (e.g., sense of place, architectural coherence, and the like) are certainly of great interest but would require a fundamentally different, more qualitative, analytic strategy. An additional consideration was the particular relevance of these variables for prescriptive policy recommendations. Change of each variable in the proposed study is readily accomplished via either architectural design or modification of residence life policy. Finally, this set of variables is clearly consistent with the "mainstream" literature on residential environments and, therefore, is an appropriate point of departure for an investigation into this special type of home, the campus community.

Second, this study provides a geography of student adjustment that allows formulation of spatially targeted interventions by counseling center or other university staff. That is, this analysis should provide a rough map of the need for psychological services and, perhaps, the differential spatial distribution of certain types of psychological distress.

An understanding of the impact of residential environment on the psychological functioning of college students should be useful for a diverse group of professionals,

including campus psychologists or counselors, student affairs professionals, campus planners and dormitory architects. One goal of this study is to elaborate a geography of college student adjustment that will allow spatially targeted interventions. In addition, such information may be of use to prospective and current college students making decisions to enhance their academic and personal functioning.

### Research Hypotheses

1. Resident students should report greater overall levels of psychological adjustment than commuters. If this effect is independent of psychological status at time of admission, then this hypothesis will remain viable even when pre-college mental health care is entered as a covariate. This procedure will control for the possibility that maladjusted students show a greater tendency to isolate themselves geographically from campus life. Since this is not a longitudinal study, the control procedure is necessary for this and all subsequent comparisons of adjustment levels.

2. If proximity to campus facilitates social integration, then, among off-campus residents, those living closer to campus should report fewer adjustment difficulties.

3. Students living with their family should report more adjustment difficulties than those living on-campus or off-campus not in the family home.

4. Residential population density should be negatively associated with psychological adjustment and residential satisfaction. Previous research suggests a ceiling effect such that levels of satisfaction cease to decline beyond a certain density; however, extremely high residential densities are probably not common in a population with these demographic characteristics.

5. Reported level of noise should be inversely related both to overall levels of psychological adjustment and satisfaction with living environment.

6. Elements of natural landscape visible from residences should correlate positively with adjustment; that is, the presence of adequate light, water, trees and grass in residential window vistas should be associated with better overall levels of psychological adjustment.

## CHAPTER 3 METHOD

### Participants

Participants were undergraduate volunteers from psychology classes at the University of Florida (a large state university with approximately 40,000 students), the University of Wyoming (a small state university with approximately 10,000 students), and New College of the University of South Florida (a primarily residential liberal arts honors college with approximately 600 students). Research instruments were distributed to 206 students from these institutions; 191 forms were returned; seven forms were incomplete and unusable, leaving 184 cases included in the data analysis.

Participation was subject to Institutional Research Board approval and the ethical guidelines of the American Psychological Association. Participants were provided with both written and verbal informed consent statements. Students did not receive monetary compensation for their participation; on two occasions, however, extra credit points were awarded to students who completed the survey. A copy of the informed consent statement is included in Appendix A.

Institution. Of the 184 participants in the final sample, 125 (68%) were students at the University of Florida. Thirty-five (19%) were from New College of the University of South Florida; the remaining 24 students (13%) were from the University of Wyoming.

Ethnicity. One hundred forty-six participants (79%) reported white/non-Hispanic ethnicity. The second largest group (15 students or 8%) endorsed Asian/Pacific Islander. Nine Hispanic/Latino(a) students constituted 5% of the sample. Four percent (n=7) students were African-American. Four students (2%) reported ethnicity as "other." Three students declined to indicate ethnic background.

Gender. Sixty-seven percent (n=124) of respondents were women. Men comprised 32% (n=60) of the sample.

Age. Reported age ranged from 17 to 49 years for the 183 participants who provided information. Mean age was 19.75; standard deviation was 3.68.

Year in college. Students' number of semesters in college ranged from one to 14. The mean number of terms in college was 3.04; the standard deviation was 2.57.

Marital status. Only 2.7% (n=5) of the sample endorsed the "married" category.

Sexual orientation. One hundred eighty-three participants indicated their sexual orientation. The vast majority of students (95%) endorsed the "heterosexual (straight)" category. Six students (3%) reported they were bisexual. Three students (2%) endorsed the "gay/lesbian" category.

Fraternity or sorority membership. Only two students (1.1%) reported membership in a campus Greek organization.

### Materials

Participants first completed a 25-item written questionnaire including demographic items as well as questions regarding predictor variables and potential covariates. The latter sections included information about residential location, type of accommodation, physical

aspects of housing environment, residential satisfaction, year in college, and psychological treatment history. The questionnaire is included in Appendix B.

Criterion measures of adjustment included the 41-item College Maladjustment Scale (Mt; Kleinmuntz, 1960) of the Minnesota Multiphasic Personality Indicator-2 (MMPI-2; Butcher *et al.*, 1989). A 43-item Mt was developed for the original MMPI (Hathaway and McKinley, 1943); a 41-item scale was retained in the 1989 revision. Although the scale is typically administered in embedded form (i.e., as part of the full 567-item MMPI-2, Kleinmuntz (1961) provides norms and validation for short-form administration of the scale including only the 43 original Mt items and 42 items from standard MMPI validity scales.<sup>1</sup> The stand-alone Mt was selected for the present study to ensure single-session administration of the research protocol; the entire MMPI-2 typically requires the majority of two hours to complete. To further expedite administration, the MMPI validity items were omitted. Although the stand-alone Mt without validity items has never been validated with reference to the full MMPI, this type of validation has been performed using other MMPI supplementary scales (cf., Herman, Weathers, Litz, & Keane, in press); moreover, Kuczka and Handal (1990) provide validation data for the stand-alone Mt with reference to Langer Symptom Survey (Langer, 1962). Thus, the use of the stand-alone Mt scale can be defended on both empirical and pragmatic grounds.

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<sup>1</sup> The additional items comprise the 15-item L scale and the 27-item K-scale. Briefly, the former is designed to identify persons attempting to fake good by presenting themselves in an overly-virtuous light; the latter is associated with defensiveness regarding the presence of psychological problems. These are extensively covered in the MMPI literature (e.g., Graham, 1993).

The second criterion measure was the 108-item College Adjustment Scales (CAS; Anton and Reed, 1991). The CAS, described in Chapter 2, is a relatively new instrument designed to assist college counseling center professionals in screening the mental health needs of students. As such, the instrument was normed on a sample composed primarily of college student, and, therefore, is a logical choice for use in this investigation.

Although the CAS is not a diagnostic instrument, it offers normed data regarding the type and magnitude of a student's self-reported adjustment difficulties. The CAS offers raw scale scores and linearly-transformed McCall's T-scores (mean=50; SD=10) for nine aspects of college student adjustment rationally selected on the basis of screening needs reported by campus mental health providers. The CAS scales include Anxiety (AN), Depression (DP), Suicidal Ideation (SI), Substance Abuse (SA), Self-esteem (SE), Interpersonal Problems (IP), Family Problems (FP), Academic Problems (AP), and Career Problems (CP). Students respond to twelve four-point likert scale items for each scale; responses are summed to yield a raw scale score.

### Design and Procedure

Participants completed written survey items in class. Students were informed that this is a study of campus living arrangements and their impact on student life. First, each participant was provided with written and oral informed consent statements. After item packets were distributed, students were instructed to first complete the sections requesting demographic and predictor variable information. Since the psychological items were potentially evocative of emotional reactions affecting student's ratings of housing

environments, the Mt and CAS were presented last in the packet. Students recorded responses on an anonymous answer sheet. The time required for administration, including instructions, ranged from 30 to 40 minutes.

### Analytic Strategy

The Mt items proved unexpectedly problematic for students to complete, apparently because answers were to be recorded on a separate scan-tron answer sheet. As a result, a number of students either skipped the Mt all-together or failed to complete the entire scale. These procedural difficulties cast serious doubt on the validity of the Mt data; for this reason, and because the Mt's predictive validity has been questioned in the literature (Dahlstrom, Welsh, & Dahlstrom, L.E., 1975), Mt scores were removed from the data set.

A visual examination of the distribution of CAS scale scores revealed that the distribution of McCall's T-scores approximated normality more closely than that of raw scores; therefore, T-scores were chosen as the unit of analysis in the criterion data set. Since the remaining data set contained multiple conceptually-related dependent variables (i.e., the nine CAS scales, which are intercorrelated; Anton & Reed, 1991), the first-line analytic procedure was a multivariate analysis of variance (MANOVA) including all predictor variables and each scale of the CAS in the criterion variable set.. The MANOVA was followed by a series of step-wise multiple regression analyses for each predictor variable that achieved significance in the initial multivariate analysis.

The pairing of an omnibus MANOVA with follow-up univariate analyses is quite common in the psychology literature and has typically been thought to control for Type-I statistical error resulting from multiple univariate tests. This assumption has been



challenged by Huberty and Morris (1989), who argue that multivariate and univariate techniques address distinct research questions. The former analyses are appropriate to address overall effects and, less directly, to explore patterns among and contributions of outcome variables; the multiple univariate strategy is appropriate when outcome variables are conceptually distinct, when research is exploratory, or when the dependent variables of interest have been previously studied in univariate contexts. In this last case, Huberty and Morris (1989) contend that MANOVAs may be used in conjunction with ANOVAs, if the appropriate assumptions for each are met. In the present study, the dependent measures are designed to tap constructs (e.g., depression, anxiety, substance abuse) that have repeatedly been investigated singularly via univariate analysis. Thus, the two-prong multivariate-univariate strategy seems justifiable.

A second set of analyses examined the structure of the outcome variable set. This was accomplished with presentation of a Pearson product-moment correlation matrix of *t*-scores for all CAS scales and with presentation of a principal components factor solution describing the internal structure of the CAS. Principal components analysis is a factor-analytic technique that reduces a data set to a smaller number of factors that account for a significant proportion of the overall variance. The procedure yields eigenvalues, which indicate the relative importance of each factor and factor loadings, which are essentially correlations indicating the strength and direction of the association of individual variables with a given factor (Dunteman, 1989).

As is described more fully in the next chapter, the preceding analysis revealed significant overlap among the CAS scales, casting doubt upon the status of each scale as a conceptually distinct measure. Since this result implies that the variation in each scale may

be attributed to a single factor underlying overall adjustment, a third analysis used a composite criterion variable intended to measure overall level of college adjustment. This variable was rationally constructed by computing the average t-score elevation on the CAS. The single composite measure was amenable to multiple regression; therefore, the final analysis was a stepwise multiple regression. A stepwise procedure was chosen because the model allows independent variables to enter the equation in stages according to their predictive strength. The technique identifies those variables making the most important contributions to adjustment while simultaneously accounting for both multicollinearity in the predictor set and the contributions of other variables.

## CHAPTER 4 RESULTS

### Descriptive Characteristics of the Variable Set

Descriptive statistics for predictor and criterion variables are reported in this section.

Table 4-1 is a summary of the housing types reported by students. The figures reflect a roughly even split between on-campus and off-campus residents in the final sample. The majority of on-campus residents resided in a single-room dormitory, although a significant number reported living in a dormitory suite (i.e., a multiple-room residence, often with a shared common area). Suite-style accommodations are increasingly popular dormitory designs; in fact, dormitories currently under construction at New College will offer suite-style dormitories by fall, 1998. Among the 48.4 % of students residing in off-campus housing, only a minority (n=10) were living with their family of origin. The remaining off-campus residents lived alone or with roommates; a very small number of married students lived with their spouses.

Table 4-1: Types of Housing Units

Type	Frequency	%
On-campus	95	51.6
Single-room dormitory	59	32.1
University apartment	2	1.1
Suite (multiple rooms)	23	12.5
Other	11	6.0
Off-campus	89	48.4
Without parent(s)	79	42.9
With parent(s)	10	5.4

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Table 4-2 summarizes selected environmental features reported by students. The modal student reported one or two roommates, although other living arrangements are represented in the sample. Mean distance from campus was 2.77 miles; in all cases in which students resided in on-campus housing, a distance of zero miles was assigned. Distance from campus varied widely, primarily because a small number of participants in the University of Florida sample were first-term summer students living at home. Students reported an average of 2.13 windows in the room in which they spent the most time. The remaining variables summarized in this section (light, noise, and satisfaction) were each rated on a seven-point likert scale.

Table 4-2: Environmental Characteristics of Housing Units

Characteristic	N	Min	Max	Mean	SD
Roommates	184	0	16	1.71	1.59
Distance	184	0	55	2.77	8.33
Windows	181	0	15	2.13	1.82
Light	183	2	7	5.00	1.21
Noise	184	1	7	3.72	1.53
Satisfaction	184	1	7	4.73	1.40

Note: Cases of N<184 are due to missing values. Light, noise, and satisfaction were rated on a 7-point likert scale.

The rooms in which students reported spending the most time are shown in Table 4-3. The classification of rooms was derived from participants' unstructured self-report, and categories are therefore tentative. Nonetheless, results indicate that three living spaces were most utilized by students; these rooms, in order of importance, are bedrooms, family (living) rooms, and as anticipated for on-campus residents, dormitory rooms. Other types

of rooms were cited much less frequently; a small number of blank or ambiguous responses were placed in the other/not reported category.

Table 4-3: Most Commonly Used Rooms

Room Type	Frequency	%
Bedroom	80	43.5
Study	2	1.1
Family or Living Room	58	31.5
Kitchen	5	2.7
Dormitory Room	34	18.5
Bathroom	1	.5
Other/Not Reported	4	2.2

Table 4-4 summarizes the landscape elements that students reported were visible from the room in which they spent the majority of time. Trees and grass were the most common landscape features, reported by 91.3% and 84.8% of students, respectively. A smaller number of students (14.1 %) indicated that water was visible. In addition, the majority of students noted the presence of built structures (buildings and concrete) in their window vistas.

Table 4-4: Visible Landscape Elements in Most Commonly Used Room

Feature	% Reporting
Water	14.1
Trees	91.3
Grass	84.8
Other Buildings	67.4
Concrete	63.6

The psychological treatment history of study participants is reported in Table 4-5. A surprisingly large number of students (28.3%) indicated that they had received some form of mental health services prior to enrolling at their present educational institution; mental health services were defined work with a "psychologist, psychiatrist, or other type of mental health professional for a psychological or personal problem." Additionally, 12.5 % reported treatment since beginning study at their current college or university; 8.2 % were currently in treatment or were planning to seek services within thirty days of the study.

Table 4-5: Psychological Treatment History of Participants

Time of Treatment	%
Prior to entering college	28.3
Since entering college	12.5
Currently in treatment <sup>a</sup>	8.2

<sup>a</sup> Includes those planning to seek treatment within 30 days

Table 4-6 lists mean t-scores and standard deviations for each of the nine College Adjustment Scales (CAS) subscales. A visual examination of this data suggests that the performance of students in the current study was similar to that of students in the CAS normative sample, in which the mean t-score and standard deviation for each scale were 50 and 10, respectively. Scale t-score means in the current study ranged from 48.73 (SE) to 51.59 (SD); standard deviations ranged from 9.32 (CP) to 11.43 (SE). Thus, the central tendency and distribution of scores in the present sample appear comparable to those previously reported for the general college population.

Table 4-6: Summary of McCall's T-scores on CAS Scales

Scale	Mean	SD
Anxiety (AN)	50.57	10.33
Depression (DP)	50.30	11.00
Suicidal Ideation (SI)	51.59	9.59
Substance Abuse (SA)	51.03	9.60
Self Esteem (SE)	48.73	11.43
Interpersonal Problems (IP)	50.72	9.63
Family Problems (FP)	50.12	9.54
Career Problems (CP)	50.93	9.32
Academic Problems (AP)	48.73	11.20

### Omnibus Analyses

The first stage of analysis employed an omnibus multivariate analysis of variance (MANOVA) including predictor variables as well as the criterion set, which included all nine subscales of the CAS. The MANOVA procedures determine the statistical significance of individual predictors when covariation in the criterion variable set is controlled. Since a visual examination of scores on the CAS subscales revealed that the McCall's t-score distributions more closely approximated normality than those of raw scale scores, t-scores are used in the criterion variable set for this and all subsequent analyses.

Names of predictor variables are abbreviated as follows. SCHOOL represents the institution presently attended (University of Florida, New College, or University of Wyoming). SEX denotes reported gender; AGE is reported age in years. TERMS represents the number of semesters attended at the student's current institution. TXPRIOR is a dummy variable representing psychotherapy or counseling prior to enrolling in the student's present school. TXSINCE and TXNOW are dummy variables denoting psychological treatment since enrollment or at the present time, respectively. MATES

represents the number of roommates reported. DISTANCE is a measure of distance from campus (rounded to the nearest half mile); on-campus residents received a score of zero on this variable. PARENTS is a dichotomous measure indicating whether the student resided with his or her family of origin. ON\_OFF refers to location of the student's current residence (on or off-campus). WATER, GRASS, BUILDING, and CONCRETE are dummy codes representing the presence or absence of each landscape feature in the student's residential window vista. NOISE and LIGHT are 7-point Likert scale ratings of noise and light levels in the student's current residence. SATIS is a Likert scale rating of reported residential satisfaction.

MANOVA results for all predictor variables are summarized in Table 4-7, which includes values for Wilks' Lambda, an F statistic, degrees of freedom and significance level. Since the present study is largely exploratory, variables significant at the .10 level were included for follow-up analyses. However, these variables are distinguished from those achieving significance at the .05 convention in the following table. Significant predictors can be placed in three categories. First, the demographic variables of institution attended, gender and age had statistically significant impact on adjustment as measured by the CAS scales. Second, psychological treatment history was related to current adjustment. Current treatment was the most significant predictor; however, treatment since enrollment and treatment prior to college also made significant contributions. Finally, a number of environmental variables achieved significance. These included number of roommates; subjective ratings of noise, light, and satisfaction; and the presence of grass in residential window vistas.



### Follow-up Analyses

The next stage of analysis employed a series of step-wise regression equations to more fully elucidate the impact of predictor variables on each scale of the CAS. Only variables that achieved significance at the .10 or higher level in the omnibus MANOVA were retained in these subsequent analyses. As a group, this series of analyses provides greater elaboration of environmental impact on specific facets of college adjustment. However, a preliminary note of caution is warranted; as demonstrated later in this paper, the psychometric properties of the CAS render conclusions regarding specific adjustment difficulties problematic, since a single factor of distress appears to underlie the vast majority of variation on purportedly specific subscales. Nonetheless, the following regression analyses contribute to a fuller understanding of the present data by offering tentative models of scores on individual subscales.

#### Anxiety

The CAS Anxiety (AN) scale reflects “physical and psychological correlates of anxiety” (Anton & Reed, 1991, p. 5). High scorers may exhibit bodily tension, autonomic hyperarousal, hypervigilance, worries or intrusive thoughts. Results of stepwise regression of predictors on the AN scale are presented in Table 4-8. Current treatment was the most powerful predictor, followed by the presence of grass in window views. Although the impact of grass was of lesser magnitude than that of current treatment, the effect remained statistically significant even when the variation in AN predicted by treatment status is taken into account. Those students currently in psychological treatment tended to report higher levels of anxiety, while the presence of grass, as predicted, was associated with reduced levels of reported anxiety. The R-square value for this model is .112; thus current

treatment status and the presence of grass together account for 11.2% of the total variation in AN scores.

Table 4-7: MANOVA Test Statistics by Predictor

Variable	Lambda	F	Num DF	Den DF	p
SCHOOL	.744	2.62	18	296	.0004*
SEX	.809	3.89	9	148	.0002*
AGE	.896	1.91	9	148	.0540*
TERMS	.975	.42	9	148	.9214
TXPRIOR	.909	1.64	9	148	.1089**
TXSINCE	.870	2.46	9	148	.0122*
TXNOW	.866	2.55	9	148	.0093*
ON_OFF	.947	.92	9	148	.5061
MATES	.909	1.65	9	148	.1048**
NOISE	.903	1.76	9	148	.0811**
LIGHT	.900	1.82	9	148	.0684**
SATIS	.848	2.94	9	148	.0031*
WINDOWS	.966	.56	9	148	.8078
WATER	.965	.96	9	148	.7949
GRASS	.878	2.28	9	148	.0202*
TREES	.935	1.14	9	148	.3386
BUILDING	.936	1.13	9	148	.3445
CONCRETE	.945	.96	9	148	.4720
DISTANCE	.945	.95	9	148	.4848
PARENTS	.949	.89	9	148	.5385

\*Significant at .05 level \*\*Significant at .10 level

Table 4-8: Prediction of AN Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	54.36	1.89	.	824.5	.0001
TXNOW	11.19	2.74	.0769	16.7	.0001
GRASS	-5.44	2.05	.0350	7.0	.0088

### Depression

The Depression (DP) scale of the CAS purports to measure the “physical and psychological correlates of depression” (Anton & Reed, 1991, p. 5), including fatigue, sadness, hopelessness, isolation and anhedonia.<sup>1</sup> A summary of the regression equation predicting DP scores is presented in Table 4-9. Older participants tended to achieve lower DP scores than those of younger students, indicating a negative relationship of age and report of depressive symptoms or experiences. In addition, students who had sought psychological treatment since enrolling in their current institution achieved significantly higher DP scores, even when the effects of age were simultaneously controlled. However, none of the environmental variables (including reported light level) made a contribution beyond that of age and treatment effects. This model accounts for 12.4% of the variation of depression scores.

Table 4-9: Prediction of DP Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	64.44	4.48	.	206.8	.0001
AGE	-0.79	.23	.0650	11.9	.0007
TXSINCE	12.14	2.05	.0585	22.1	.0001

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<sup>1</sup>Anhedonia, the marked loss of interest or pleasure in activities previously enjoyed, is a key diagnostic criterion for Major Depressive Disorder (American Psychiatric Association, 1994).

### Suicidal Ideation

Suicidal Ideation (SI) scores are indicative of suicidal thoughts or suicidal behaviors. Anton & Reed (1991) recommend that even moderate elevations should signal the need for further psychological evaluation. As shown in Table 4-10, younger students reported higher levels of suicidal ideation. As with DP, students who reported psychological treatment subsequent to entering college were more likely to produce elevated scores. Together, age and treatment effect account for 5.2% of the variation in suicidal ideation scores. One environmental feature, grass, approached significance ( $p=.09$ ) and would have explained an additional 2.4% of variation in SI scores.

Table 4-10: Prediction of SI Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	65.24	4.23	.	237.6	.0001
AGE	-0.58	.21	.0218	8.1	.0050
TXSINCE	5.60	2.33	.0301	5.8	.0173
GRASS	-3.34	1.96	.0238	2.9	.0903*

\*Approached significance

### Substance Abuse

The SA scale is designed to reflect difficulties in a number of areas negatively impacted by substance abuse, including academics, social behavior and relationships. Regression modeling of SA scores is summarized in Table 4-11. When the effects of TXPRIOR are accounted for, no other variables have additional predictive power. Although this model is significant, TXPRIOR explains only 3.8% of the variation in SA

scores, clearly indicating that factors external to the present study are more relevant to substance abuse scores.

Table 4-11: Prediction of SA Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	49.85	.83		3602.5	.0001
TXPRIOR	4.19	1.56	.0384	7.2	.0082

### Self Esteem

Table 4-12 summarizes the prediction of SE scores. The SE scale is designed to measure global self-esteem. High scorers tend to have poor self-esteem and self-confidence, which are reflected in their own opinions of their abilities, achievements, and attractiveness.

Younger students tended to report more problems with self-esteem, as did students who had received psychological treatment since coming to college. Additionally, even with the effects of age and treatment history simultaneously controlled, ratings of home light level were correlated with SE scores. The direction of this relationship was in the expected direction; namely, poor lighting was associated with increased problems with self-esteem.

The model of self-esteem is the strongest in this series; treatment, light, and age effects together account for 14.7% of the variation in SE scores.

Table 4-12: Prediction of SE Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	68.09	5.28		166.4	.0001
AGE	-0.59	0.24	.0295	6.1	.0144
TXSINCE	11.30	2.68	.0688	17.8	.0001
LIGHT	-1.82	0.67	.0485	7.3	.0074

### Interpersonal Problems

The IP scale measures "the degree to which the student has difficulty relating to others" (Anton & Reed, 1991, p. 6), which may be reflected in dependency, distrust, vulnerability or argumentativeness. A regression summary for IP scores is presented in Table 4-13. As evident in the summary, age was again a significant factor, and the trend for younger participants to report greater difficulties was continued. Furthermore, treatment since entering college continued to play an important role; students who had sought counseling or psychotherapy evidenced higher IP scores. Overall, this model is of moderate predictive strength, accounting for approximately 8.2 % of the total variation in IP scores.

Table 4-13: Prediction of IP Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	64.66	4.02		259.0	.0001
AGE	-0.74	0.21	.0371	13.2	.0004
TXSINCE	6.78	2.31	.0444	8.6	.0038

### Family Problems

The CAS FP scale purports to measure a variety of family concerns, including difficulty with individuation and worry regarding family conflict (Anton & Reed, 1991). A model of FP scores is presented in Table 4-14. Interestingly, the presence of grass in window vistas was associated with lower scores. This finding is consistent that the presence of natural environmental features should ameliorate psychological distress, although the specific relationship of grass and family conflict is difficult to place in a

theoretical context. Moreover, this model is among the weakest in the series, accounting for only 2.7% of the variation in FP scores.

Table 4-14: Prediction of FP Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	53.85	1.82		871.2	.0001
GRASS	-4.36	1.98	.0265	4.9	.0286

#### Academic Problems

The Academic Problems (AP) scale of the CAS is associated with poor study skills, inefficient time management and concentration difficulties. A summary of regression on AP scores is presented in Table 4-15. The presence of grass was associated with lower levels of reported academic difficulties. However, contrary to expectation, residential satisfaction (SATIS) was associated with increased academic difficulty. This counterintuitive finding will be explored more fully in the following chapter. Grass and satisfaction together account for 5.4% of the variation in AP scores.

Table 4-15: Prediction of AP Scores

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	48.19	3.23		222.7	.0001
SATIS	1.28	0.60	.0540	4.5	.0349
GRASS	-6.54	2.35	.0300	7.7	.0061

### Career Problems

The Career Problems (CP) scale of the CAS is designed to measure difficulties in vocational goal setting and decision making (Anton & Reed, 1991). Although high scores on this scale may be associated with anxiety regarding career planning or decision making, the CP scale seems logically less strongly associated with psychological disturbance or, for that matter, the impact of home environment. Not surprisingly, perhaps, no predictor variable in the model achieved or approached significance at the .05 level for Career Problems.

### Factor Structure of the College Adjustment Scales

The forgoing analyses raised important questions regarding the psychometric adequacy and factor structure of the CAS. As noted, the initial series of MANOVA analyses yielded only a small number of significant predictors. Since MANOVA procedures test for predictor effects while controlling for intercorrelation in the criterion variable set, the likelihood of significant results decreases as multicollinearity increases. Anton and Reed cite scale intercorrelation as an important limitation in the CAS Manual (1991), and the present study replicates their finding. T-score intercorrelations for all nine CAS subscales are presented in Table 4-16. The strong interrelationships among CAS scales are evident on first examination of the correlation matrix. All individual correlations are in the moderate or higher range. In fact, the lowest correlation, between SA and CP t-scores, was .28, indicating that 7.8% of the variation of each scale is shared between both. All other correlations were higher, including several in excess of .70. T-scores for



depression and anxiety evidenced the strongest relationship ( $r=.77$ ), indicating nearly 60% of shared variation between the scales.

Table 4-16: Correlation Matrix of CAS Scale T-Scores

	AN	DP	SI	SA	SE	IP	FP	CP	AP
AN	1.0000	0.7673	0.4699	0.3335	0.7132	0.6984	0.5686	0.4925	0.5786
DP	0.7673	1.0000	0.5444	0.3524	0.7440	0.6441	0.5516	0.5305	0.5889
SI	0.4699	0.5444	1.0000	0.4021	0.5029	0.4901	0.4804	0.4167	0.3295
SA	0.3335	0.3524	0.4021	1.0000	0.3399	0.4376	0.4343	0.2753	0.4037
SE	0.7132	0.7440	0.5029	0.3399	1.0000	0.5995	0.5171	0.5018	0.5285
IP	0.6984	0.6441	0.4901	0.4376	0.5995	1.0000	0.6348	0.4801	0.4936
FP	0.5686	0.5516	0.4804	0.4343	0.5171	0.6348	1.0000	0.4226	0.5369
CP	0.4925	0.5305	0.4167	0.2753	0.5018	0.4801	0.4226	1.0000	0.4625
AP	0.5786	0.5889	0.3295	0.4037	0.5285	0.4936	0.5369	0.4625	1.0000

Note: Values represent Pearson product-moment correlation coefficients.

The level of intercorrelation among CAS scales is a serious psychometric limitation of the instrument. First, strong relationships among scales suggest that a smaller number of constructs underlie responses and, therefore, that distinctions based on individual scale scores may be unwarranted in some cases. The possibility exists that all CAS scales are measuring the same thing or, at least, that the scales are tapping very similar phenomena. More succinctly: If one scale score is known, others can be predicted. Second, these interrelationships raise questions about the discriminant validity of the CAS. That is, if the subscales are, in fact, primarily measuring a single phenomenon (or small set of related phenomena), then the names of individual scales may be clinically misleading. This is the case when the underlying structure of the CAS is not sufficiently sensitive to distinguish among the nine subscales. More concretely, the difference between depression and anxiety scores becomes less meaningful when more than half of their variation is shared. Since this

possibility was evident in the correlation matrix, a factor-analytic procedure was employed to determine in fuller detail the underlying structure of the CAS.

A principal components analysis was performed on the correlation matrix of t-scores for each scale of the CAS. Principal components analysis, like classical factor analysis, is essentially a data reduction technique (Dunteman, 1989) that extracts a smaller number of uncorrelated, or orthogonal, factors that are linear transformations of observed variables. In the present analysis, a varimax rotation procedure was chosen, in order to achieve maximum separation of any factors underlying the CAS data. This procedure is intended to minimize the number of variables associated with each factor and, therefore, to facilitate interpretation of the resultant components of the data set (Norusis, 1994).

Extracted components, associated eigenvalues, and proportion of variance accounted for by each component are listed in Table 4-17. Eigenvalues, which represent the relative strength of a factor, are used as criteria for inclusion of a given factor into the model. Although different eigenvalue scores have been employed, a cutoff value of 1.0 is a widely-accepted convention. When this convention is applied to the current model, only one factor meets inclusion criteria. This factor accounts for 57% of the variation in subscale t-scores and is by far the strongest component of the model. Three additional factors, which do not meet inclusion criteria, are listed for purposes of comparison. Although eigenvalues for these factors approach 1.0, note that each of the subsequent factors accounts for less than 10% of the total variation in the data set.

Table 4-17: Components and Eigenvalues of the Correlation Matrix

Component	Eigenvalue	Difference	% Variation	Cum %
FACTOR 1*	5.12857	4.28076	0.569841	0.56984
FACTOR 2	0.84781	0.17261	0.094201	0.66404
FACTOR 3	0.67520	0.06846	0.075022	0.73906
FACTOR 4	0.60673	0.09979	0.067415	0.80648
<u>Note:</u> varimax rotation		*meets inclusion criterion		

Table 4-18 shows factor loadings for all nine CAS subscales on the four strongest factors. Factor loading values represent a correlation between a given variable and factor and, thus, are a measure of the strength of association. Table 4-18 underscores the problematic nature of the CAS factor structure by demonstrating that most CAS subscales are moderately correlated with Factor 1. Only suicidal ideation, substance abuse and career problems have factor loadings less than .30. Thus, the factor accounting for the majority of variation in the data set is nebulously defined by moderate association with the majority of variables.

To understand the problematic nature of this factor structure, consider a hypothetical alternative. If the factor structure of the CAS were such that factors were defined by a small number of variables, the structure of the data set could be said to correspond to the purported scale structure of the CAS. However, in the present case, in which the factors are not clearly defined by their association with subscales, the empirical meaning of individual scales becomes ambiguous. Since the majority of variables are

related to only one common factor, the possibility exists that a single psychological dimension underlies the majority of variation on the CAS, regardless of scale.

The above critique notwithstanding, Factors Two through Four in Table 4-18, although quite weak, demonstrate some dimensionality that should be noted. Factor Two is characterized primarily by a strong association with SA scores ( $r=.81$ ), suggesting a weak trend for substance abuse scores to vary somewhat independently of other scales. Factor Three is positively related to suicidal ideation ( $r=.75$ ) and, less strongly, negatively related to academic problems ( $r=-.61$ ). Factor Four is defined primarily by a strong association with career problems ( $r=.87$ ). Given their weakness, these factors should be interpreted with caution. However, their structure raises some interesting tentative hypotheses, namely, that student report of substance abuse and career problems may be independent, to some degree, of scores on other scales.

Table 4-18: Factor Loadings for CAS Scale T-Scores

VAR	Factor 1	Factor 2	Factor 3	Factor 4
T_Anxiety	.37477	-.26351	-.07139	-.27052
T_Depression	.38034	-.24773	.05367	-.13570
T_Suicidal Ideation	.29839	.22942	.74634	.03305
T_Substance Abuse	.24637	.80586	-.13563	.10660
T_Self-esteem	.36159	-.26104	.08631	-.15787
T_Interpersonal Problems	.36130	.04206	.00043	-.24224
T_Family Problems	.33600	.22023	-.13517	-.16589
T_Career Problems	.29645	-.22049	.09892	.86555
T_Academic Problems	.32108	-.01077	-.61733	.18879

### Creation and Prediction of a Composite Measure of Global Distress

This section reports an attempt to respond to problems created by the multicollinearity of CAS scales, which negatively impacted the likelihood of finding significant results in the initial series of MANOVAs and confuses the interpretation of individual scales. The factor structure reported in the previous section warrants the assumption that a single psychological phenomenon is responsible for the majority of variation on the CAS subscales. Since the face content of the CAS taps a broad range of functioning, it is logical to assume that this underlying factor may be a measure of global psychological distress. On the basis of this assumption, a composite measure of distress was formulated by computing the average t-score elevation across the nine CAS subscales. This number, which represents a mean standardized level of symptom reporting, was then used as the single criterion variable in a final stepwise regression analysis. A second advantage of this single-criterion analysis was the ability to forgo the use of MANOVA, which substantially limited the number of predictor variables. Thus, this last analysis included all predictor variables, regardless of their performance on the initial MANOVA.

Regression results are summarized in Table 4-19. Surprisingly, only two variables—age and psychological treatment since enrollment—are significant predictors of global distress. The meaning of this result is unclear, since environmental variables were significant predictors in previous analyses. Apparently, environmental predictors have no additional explanatory power for scores on the global distress measure. However, these results should be viewed with caution, given that the composite distress

measure was a post-hoc creation for the present study and has not been validated. This model accounts for 10.3% of the total variation in average t-score elevation.

Table 4-19: Prediction of Global Distress

Variable	Parameter Estimate	Std. Error	Partial R2	F	P
Intercept	60.64	3.18		364.0	.0001
AGE	-0.56	0.16	.0411	12.1	.0007
TXSINCE	7.31	1.83	.0614	15.0	.0001

Although no environmental variables entered the stepwise regression equation, bivariate results were significant for grass ( $t=2.24$ ,  $p=.03$ ) and concrete ( $t=1.94$ ,  $p=.05$ ). This suggests that, although grass and concrete may have some relationship to global distress scores, neither variable contributes more predictive power than the simple combination of age and treatment since enrollment. Thus, using the global distress measure criterion affords little additional understanding of environmental impact on adjustment.

#### Summary of Hypotheses

Taken together, this series of analyses provides limited evidence of the impact of environmental variables on psychological adjustment. The most reasonable summary statement is that, although subject and treatment variables have the most powerful association with psychological status, some environmental variables (especially grass, noise, light, residential satisfaction and, to a lesser degree, number of roommates) may account for additional variation in student adjustment. Let us revisit the original set of research hypotheses.

The first hypothesis predicted that residential students should show greater levels of adjustment than off-campus residents. The present results do not provide support for this hypotheses. First, MANOVA analyses failed to demonstrate the significance of residential location. Second, residential location did not enter the regression equation predicting global distress. In fact, even a simple univariate test failed to show predictive significance ( $t=.25$ ,  $p=.80$ ) of residential location for global distress.

The second hypotheses, that psychological adjustment should be inversely related to distance of home from campus, was not supported in the MANOVA analysis. Nor was distance significantly correlated with global distress in the multiple or bivariate regression analysis; in fact, a simple bivariate correlation (in which on-campus residents received a value of zero) indicated no relationship ( $r=.002$ ,  $p=.98$ ).

A third hypothesis, based on the work of Wilson, Anderson, and Fleming (1987), predicted that students living with family would report more adjustment difficulties than those living at home, primarily as a function of enmeshment. This hypothesis, too, was supported neither in the omnibus MANOVA nor in the prediction of global distress. This result was not the consequence of predictive overlap with other factors, since a simple t-test showed that family of origin had no relationship with global distress ( $t=.32$ ,  $t=.75$ ). However, any actual effect may be obscured by skewed sampling, since only ten students of 184 reported living with their families of origin.

A fourth hypotheses suggested a curvilinear relationship between number of roommates and adjustment. As noted in Chapter 2, such a hypothesis is difficult to test in this population, because the number of roommates is restricted in range. The mean number of mates was 1.70, with a standard deviation of 1.6. Participants reported in nearly all cases

a number ranging from zero to four (an outlier of 16 was an exception). In spite of this restricted range, number of roommates approached significance in the initial MANOVA ( $F=1.65$ ,  $p=.10$ ). Although the specific effects of roommates were not demonstrated in the follow-up analyses reported above, mates were a small but significant predictor of substance abuse scores in a preliminary analysis, which excluded treatment since enrollment as a predictor ( $r^2=.025$ ,  $F=4.60$ ,  $p=.03$ ). The relationship was negative, raising the tentative but interesting possibility that those living alone are more likely to report substance abuse problems.

A fifth hypotheses regarding the relationship of noise level to adjustment received limited empirical support as well. Noise effects neared significance in the omnibus MANOVA ( $F=1.76$ ,  $p=.0811$ ). Specific effects of noise were not of sufficient strength to achieve significance in the follow-up analyses. However, effects were in the hypothesized direction; for example, reported noise level was positively (but insignificantly) correlated with global distress.

A sixth hypothesis, or set of related hypotheses, regarded the impact of natural landscape elements in student residences on psychological well-being. Specifically, the presence of water, trees, grass, and adequate light were hypothesized to promote psychological health (cf. Kaplan & Kaplan, 1989). Conversely, the presence of concrete and buildings was predicted to have a detrimental effect on adjustment. This set of hypotheses received the strongest empirical support.

First, grass achieved significance in the omnibus MANOVA ( $F=2.28$ ,  $p=.02$ ). The beneficial impact of grass was evident in its association with lower levels of anxiety ( $F=7.0$ ,  $p=.01$ ), fewer reports of family problems ( $F=4.9$ ,  $p=.03$ ), and lower levels of academic



distress ( $F=7.7$ ,  $p=.01$ ). In addition, grass approached significance in the model of suicidal ideation scores ( $F=2.9$ ,  $p=.09$ ); the direction of relationship was in the hypothesized direction. In a preliminary model excluding treatment since enrollment as a predictor, grass was the only significant negative predictor of suicidal ideation ( $F=4.14$ ,  $p=.04$ ). That analysis also demonstrated that grass was negatively associated with global distress ( $F=5.57$ ,  $p=.02$ ).

Reported light levels approached significance in the initial MANOVA ( $F=1.82$ ,  $p=.07$ ) and produced significant results in the follow-up analyses. In the results reported above, higher light levels were associated with better self-esteem scores ( $F=7.3$ ,  $p=.01$ ). In the analyses excluding treatment since enrollment, poor lighting was associated with increased report of depressive symptoms ( $F=5.08$ ,  $p=.03$ ).

Finally, self-report of residential satisfaction ("Overall, how satisfied are you with your current residence?") achieved significance in the MANOVA ( $F=2.94$ ,  $p=.003$ ). This likert-scale question, included at the end of the section on housing environment, was intended to represent a global self-assessment of residential satisfaction. In the regression results here reported, the influence of residential satisfaction was evident in its ability to predict academic problems, although the direction of association was counterintuitive ( $Beta=1.28$ ,  $F=4.5$ ,  $p=.03$ ). That is, residential satisfaction was associated with an *increased* level of reported academic problems. Although the reason for this unexpected result is unclear, a *post hoc* speculation is that, for a certain segment of the sample, satisfaction reflects residential life distracting rather than promoting academic focus.

### Psychological Treatment Effects Revisited

Since treatment effects played a significant role in most of the models tested above, a decision was made to investigate in more detail the overall impact of time of treatment on adjustment scores. The following hypothesis emerged from the previous data analyses: recency of treatment should be inversely related to overall adjustment. That is, those students currently in psychological treatment should report more difficulties than those who had treatment earlier in their college years and those who received treatment before college. Those with no treatment history should report the highest level of adjustment. This hypothesis is relevant at present because it (1) provides some indication of criterion validity for the CAS and (2) ties this study more closely to clinical services provided by college counseling centers.

A MANOVA testing for overall effects of the four levels of treatment history (none, before college, since college, and current) on the nine CAS scales yielded significant results ( $\text{Lambda}=.72$ ,  $F=2.18$ ,  $p=.0006$ ). Follow-up analyses of variance (ANOVAs) demonstrated specific treatment effects on t-scores for anxiety ( $F=7.78$ ,  $p=.0001$ ), depression ( $F=5.41$ ,  $p=.001$ ), substance abuse ( $F=2.81$ ,  $p=.04$ ), and self-esteem ( $F=4.79$ ,  $p=.003$ ). *Post-hoc* tests for anxiety scores revealed that students in current treatment had higher t-scores (mean=60.0) than those who had treatment prior to college (mean=52.1) or never (mean=48.3).<sup>2</sup> For depression, those in current treatment scored significantly higher (mean=59.0) than those who reported therapy before college (mean=51.4) or never

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<sup>2</sup> In a few cases, participants who reported two or more separate episodes of treatment fell into more than one group (i.e., current treatment and treatment before or since college).

(mean=48.3). In addition, students currently in treatment reported poorer self-esteem (mean=55.7) than those who had treatment prior to college (mean=48.7) or not at all (mean=46.9). These results provide criterion validity evidence for the CAS scales measuring depression, anxiety and self-esteem.

## CHAPTER 5 DISCUSSION

### Environment versus Treatment Effects and Student Characteristics

The role of environmental features—specifically, grass views, lighting, and noise level—in psychological well-being was documented in the previous section. In the models presented, environmental conditions were far from predominate determinants of psychological status, but the impact of environmental features made a significant, if small, incremental increase in the prediction of adjustment. Before proceeding with a discussion of the theoretical significance of these limited findings, it is appropriate to revisit methodological issues that may be relevant to the interpretation of results.

### Psychological treatment history

Three dichotomous variables (treatment prior to college, treatment since enrollment and current treatment) were used as predictors in the analysis presented here. The nature of these measures is somewhat ambiguous. The first two variables were intended to control for level of psychological adjustment prior to the student's current living arrangements. The last, however, could be conceptualized as either a predictor or an outcome variable. That is, current psychological treatment is likely to result from psychological distress; the reverse case, in which treatment causes distress, is (we hope) less plausible, assuming that competent clinicians are providing services. However, since even current treatment adds some additional strength to most of the models here presented, a decision was made to

retain each variable in the current model. The decision to incorporate treatment as a predictor at all reflects a conservative analytic strategy, since the variation accounted for by treatment could possibly obscure more subtle environmental effects. However, such a conservative approach has the advantage of documenting environmental impact independent of the decision to seek mental health treatment and, thus, speaks to the broadest possible range of college students. Finally, since this study employs an *ex post facto* correlational design, the decision to incorporate as many potential predictors as possible compensates for the lack of experimental control. Moreover, the inclusion of all treatment variables as well as environmental predictors increases the relevance of this study to both environmental and counseling psychology, because the strategy allows for the simultaneous assessment of treatment history and environmental or geographical factors.

With regard to this last point, the analysis of the relationship between recency of treatment and adjustment adds an important, more explicitly clinical dimension to our models of adjustment. These results indicate that those students in current treatment (or planning to seek treatment within 30 days) tend to report more difficulties than those who have never sought treatment or those whose treatment episode took place prior to college. Although this trend was not significant for all areas of adjustment measured by the CAS, it was significant for anxiety, depression and self-esteem. Given the assumption that current psychological discomfort is a primary motivation to seek treatment, this result supports the utility and validity of these scales.

#### Limitations of the sample and the criterion measure

Although the total sample size was fairly large ( $n=184$ ), some groups relevant to the research hypotheses were inadequately represented. The most notable among these was

students living with their family of origin ( $n=10$ ). Also, only a small portion of students reported no exposure to trees ( $n=15$ ). These small cell sizes may have provided insufficient power to detect potential effects.

A more important limitation is the psychometric inadequacy of the College Adjustment Scales. The intercorrelation among the nine subscales is problematic in two areas. First, multicollinearity necessitates the use of MANOVA, which has a net effect of reducing the number of environmental variables included for regression analysis. Second, strong intercorrelations render clinical interpretations confusing. Scales strongly related to each other are likely to measure the same underlying construct; therefore, the differential meaning of individual scales is unclear.

#### Environment and Adjustment

In spite of the rather conservative research strategy, several environmental variables showed promise as predictors of adjustment. The presence of grass was chief among these, achieving overall significance in the MANOVA as well as significance in predictive models for anxiety, suicidal ideation and academic problems. The importance of grass as a predictor of lower levels of psychological distress is consistent with mainstream theoretical and empirical models of landscape preference, which indicate that nature scenes are sought by humans because exposure to such vistas (a) facilitates recovery from fatigue through restorative impact on information processing systems (Kaplan & Kaplan, 1989) and (b) produces measurable physiological changes associated with autonomic relaxation responses (Ulrich, 1981, 1991; Ulrich et al., 1991). However, the landscape research cited has found that the beneficial impact of nature exposure includes not only grass but also other natural

elements, especially trees and water, which had no significant effects in the present study. Perhaps the failure to find convergent effects for these other natural landscape elements stems from methodological shortcomings described above; an alternative possibility is that the benefits of water and trees are more transitory than those of grass.

The presence of light was associated with self-esteem and, more weakly, with depression. This finding is convergent with research suggesting that lower light levels, especially those associated with winter, may play an etiological role in the development of mood disorders. In fact, exposure to light has been repeatedly shown to treat winter depression. Rosenthal, Sock, Skwerer, Jacobson, and Wehr (1988) provide a meta-analysis of clinical research on the effectiveness of phototherapy for Seasonal Affective Disorder (SAD).<sup>1</sup> They report that light intensity is an important predictor of antidepressant effect. Typically, patients respond best to bright florescent light (about 2,500 lux), while ordinary room light (500 lux or less) has little or no effect on symptoms. A minority of subjects, however, has responded favorably to low-intensity light; some SAD patients may benefit

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<sup>1</sup> The DSM-IV does not list SAD as a separate disorder; rather, a seasonal pattern specifier may be added to a mood disorder diagnosis. The criteria for such a specification are as follows:

A. There has been a regular temporal relationship between the onset of Major Depressive Episodes in Bipolar I or Bipolar II Disorder or Major Depressive Disorder, Recurrent, and a particular time of the year (e.g., regular appearance of the Major Depressive Episode in the fall or winter [in the absence of psychosocial stressors].

B. Full remissions (or a change from depression to mania or hypomania) also occur at a characteristic time of the year.

C. In the last two years, two Major Depressive Episodes have occurred that demonstrate the temporal seasonal relationships defined in Criteria A and B, and no nonseasonal episodes have occurred during that same period.

D. Seasonal Major Depressive Episodes . . . substantially outnumber the nonseasonal Major Depressive Episodes that may have occurred over the individual's lifetime (American Psychological Association, 1994, p. 390).

most from extremely high-intensity light (e.g., 10,000 lux). This finding implicates the neurotransmitter melatonin in SAD, because high-intensity light is required to suppress nocturnal melatonin secretion. The biological substrate of SAD is far from understood, and the debate is outside the scope of this paper. It is sufficient to note that, whatever the underlying mechanism, the antidepressant effects of light have been well-documented in the literature and were reflected in this correlational study.

### Implications for Policy

The results of this study underscore the importance of an ecological perspective on campus design. Some elements of this perspective have been studied in great detail and, consequently, have had far-reaching influence on policy makers. Examples of these widely acknowledged areas include academics, social life, extracurricular activities, counseling, multicultural awareness, sexual and gender dynamics, campus safety, and to some degree dormitory design. This study focuses attention on the last category by highlighting the impact of environmental content on student adjustment. More specifically, the importance of greenspace and adequate lighting are supported not simply because of their aesthetic value, but rather because their association with psychological functioning has been documented empirically, although admittedly in a correlational manner. From an architect's perspective, these findings provide relevant prescriptions for landscape design, although the importance of light and greenspace is certainly not a novel notion. From an ecological perspective, however, the relationship of environmental features to psychological

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well-being is perhaps more noteworthy, since the results underscore the interconnectedness of the campus system. Student well-being is not simply a function of prior psychological make-up and interaction with mental health professionals. Rather, well-being is influenced by a system of dynamic environmental factors. Physical environment and the micro-geography of homespace have a role in this ecological system. Although their impact may be small relative to other factors, their importance is certainly magnified in aggregate; this seems particularly relevant when one considers the task of designing dormspace for hundreds, or even thousands, of students.

One unexpected finding was the absence of significant differences among dormitory and off-campus residents. This result is inconsistent with classic and recent research on the experience of commuter students (Chickering, 1974; Wolfe, 1992), although much existing research has used indicators of social integration and academic progress rather than explicitly psychological measures. One conclusion is that dormitory residence promotes important connections to campus, but that these benefits are independent of psychological or psychiatric functioning. Thus, although off-campus residents may feel disconnected from campus, such disconnectedness is not necessarily reflected in increased need for psychotherapy.

#### Directions for Future Research

Alternative research instruments should be considered. Well-validated single-criterion measures are good candidates, because they simplify analytic strategy and afford clearer clinical interpretation. The Mt scale of the MMPI-2 (Kleinmuntz, 1960), which was problematic in the present study, remains a viable candidate, since it produces a single

measure of adjustment associated with a clinical picture of anxiety and feelings of ineffectualness.

A second consideration is the need for designs affording experimental control. The present study was correlational in nature and, therefore, illustrates relationships rather than causal mechanisms. While these exploratory results are an important first step, more rigorously controlled designs would provide clearer elucidation of causal impact. Of course, the logistical and ethical considerations involving random assignment to experimental living conditions make experimental studies a daunting task. Nonetheless, such design options merit further study.

Finally, qualitative approaches can yield richer knowledge of the experience of lifespace than the quantitative approach here employed. A critical point is that qualitative and quantitative approaches need not be discreet alternatives. Rather, the complimentary use of each technique has the potential to provide a more thorough understanding of campus environments.

Such an approach is not unprecedented in environmental psychology. For example, Schroeder (1991) has combined quantitative and qualitative analysis to model preference and meaning of arboretum landscapes. His approach used keywords from spontaneous descriptions of landscapes to predict environmental preferences. Work focusing on explicitly psychological issues has received attention from humanistic geographers. For example, Tuan (1974) has written extensively on topophilia, or love of place, as a reflection of the emotional ties between humans and landscape. Topophilic experiences might include feelings of at-homeness, acceptance, spiritual well-being, or even transcendency.

A more qualitative approach rounds out the ecological context of this paper; an experiential analysis goes beyond this useful, but rather mechanistic, approach by grounding aggregate results in the day-to-day lives of students. Moreover, qualitative clarifications of environmental experience add theoretical sophistication to our understanding. Witness the distinction made by Relph (1985), following Heidegger, between presence-at-hand and readiness-to-hand in the environment. The former denotes a conscious awareness, an objectification of an environmental feature. The latter connotes more subtle meaning; that is, it does not require conscious reflection but rather affords a more fundamental, direct experience of landscape. Quantitative landscape research seems to focus more intently on the present-at-hand world through the conscious examination of environmental features. This bias affects research questions as surely as it does individual responses. A more qualitative conceptualization augments the understanding derived from quantitative research through shifting attention of researcher and subject to more subtle, less conscious, aspects of place.

Few landscapes afford the variety of emotional experiences that may be encountered in a college community; few developmental periods afford as much new experience as the transition from family of origin to the university or college. Thus, campus landscapes seem uniquely positioned in the life experience of students; this context magnifies the importance of campus design. My hope is that this study provides impetus for further interdisciplinary focus on the ecology of student well-being, and that the knowledge gained will be manifest in the life space of campus communities.

### Informed Consent Statement

**Supervisor:** Dorothy D. Nevill, Ph.D., Professor of Psychology, University of Florida

Although you will be asked to provide personal information (such as age, gender, and year in school), you will not be asked to identify yourself. When the results are published, personal information will be reported only for the group. The data for this study will be kept confidential to the extent provided by law.

We do not anticipate that participation in this study will result in any discomfort or risk to you. However, you do not have to answer any question you do not wish to answer, and you may stop participating at any time without penalty of any kind.

No immediate benefits are expected from participation in the study. You will not receive compensation for your efforts.

If you have any questions about the procedures in the study, you may contact:  
Dorothy Nevill, Ph.D. Mike Campbell, M.S.

114 Psychology Building, Box 112250 or University Counseling Center  
University of Florida P.O. Box 3708  
Gainesville, FL 32611-2250 Laramie, WY 82071  
(352) 392-0617 (307) 766-2187

Questions or concerns about the rights of research participants can be directed to:  
University of Florida IRB Office  
Box 112250  
University of Florida  
Gainesville, FL 32611-2250

## APPENDIX B

Please answer the following questions about yourself and the place where you live. If choices are provided, circle the appropriate answer. If blanks are provided, fill in the appropriate answer.

**Information about you:**

1. What is your age? \_\_\_\_\_
2. What is your gender? a. Male b. Female
3. Which best describes the ethnic group to which you belong?
  - a. White (non-Hispanic)
  - b. African American,
  - c. Asian/Pacific Islander
  - d. Hispanic/Latino(a)
  - e. other
4. How many terms have you been a student at UF/UW/NC? \_\_\_\_\_
5. What is your grade point average? \_\_\_\_\_
6. Which best describes your sexual orientation?
  - a. Heterosexual (straight)
  - b. Bisexual
  - c. Gay/Lesbian

**Information about your home:**

1. Do you live on campus or off campus?      a. on campus  
    b. off campus
2. If off campus, how far away from campus is your home located? (to the nearest 1/2 mile) \_\_\_\_\_

3. If off campus, do you live with your family? a. Yes b. No

4. How many persons **in addition to you** live in your place of residence  
(your dorm room, house or apartment)? \_\_\_\_\_

5. If you live **on campus**, which best describes your residence?

a. dorm b. suite c. university apartment d. other

Optional--What is the name of your building? \_\_\_\_\_

6. Do you live in a fraternity or sorority? a. Yes b. No

Optional--What is the name of your house? \_\_\_\_\_

7. In the room where you spend most of your time at home, are there windows?

a. Yes b. No

If yes, how many? \_\_\_\_\_

a. Which of the following are visible from the room in which you spend the most time?  
(circle all that are appropriate)\_

water trees grass buildings concrete

8. How well-lit is the place that you live?

1 2 3 4 5 6 7  
poorly lit well-lit

9. In your opinion, how noisy is the place that you live?

1 2 3 4 5 6 7  
not at all noisy extremely noisy

10. Overall, how satisfied are you with your current residence?

1	2	3	4	5	6	7
not at all satisfied				extremely satisfied		

**Information about your use of counseling or psychotherapy:**

1. BEFORE you came to UF/UW/NC, had you ever seen a psychologist, psychiatrist or other type of mental health professional for a psychological or personal problem?
  - a. Yes
  - b. No
2. SINCE you came to UF/UW/NC, have you ever seen a psychologist, psychiatrist or other type of mental health professional for a psychological or personal problem?
  - a. Yes
  - b. No
3. Are you currently seeing (or planning to see within the next month) a mental health professional?
  - a. Yes
  - b. No

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## BIOGRAPHICAL SKETCH

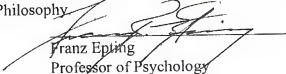
Mike Campbell was born at McCoy Air Force Base, Orlando, Florida on October 30, 1969 to Capt. Donald F. and Sylvia Campbell. During childhood, he accompanied his parents on a variety of assignments in the continental U.S. and Republic of Panama. After graduating from Rome Free Academy (Rome, NY) in 1987, Mike enrolled at New College of the University of South Florida (Sarasota, FL) where he completed a B.A. in psychology/Latin American studies in 1991. He received a M.S. in geography from The Florida State University (Tallahassee, FL) in 1993; his master's thesis, *An Informational Approach to Visual Preference of Urban Waterscapes*, was presented at the 102<sup>nd</sup> Annual Convention of the American Psychological Association (Population and Environmental Psychology Division) in 1994. Mike completed pre-doctoral internship training at the University of Wyoming (Laramie, WY) in 1997 and received a Ph.D. in counseling psychology from the University of Florida (Gainesville, FL) in 1998.

Mike currently lives in Sarasota, FL, where he is a therapist at the New College/USF Counseling and Wellness Center. He is also an adjunct faculty member at the University of Tampa. His professional memberships include the American Psychological Association, American Society of Clinical Hypnosis, Southeastern Psychological Association, and Southeastern Council on Latin American Studies. Previously, Mike served as a trustee of New College Foundation, and he is currently a director and secretary of the New College Alumnae/i Association.

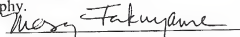
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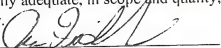
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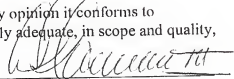
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This dissertation was submitted to the Graduate Faculty of the Department of Psychology in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment for the requirements for the degree of Doctor of Philosophy.

May 1998

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Dean, Graduate School